Name: _____ Block: _____ Date: _____

Part A: **Calculator ACTIVE.** The use of a calculator is allowed on the questions.

1.) How many root(s) does the equation have?
$$f(x) = x^2 + 9$$
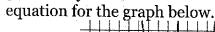
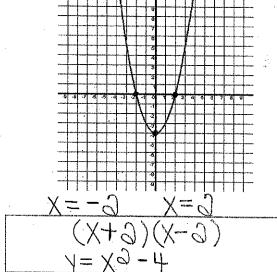$d = b^2 - 4ac$
$= (0)^2 - 4(1)(9)$
$d = 0 - 36$
$d = -36$

$\boxed{0}$

2.) What are the solutions of the equation?
$$5r^2 - 44r + 120 = -30 + 11r$$
$$\underline{-11r + 30 \quad +30 - 11r}$$
$5r^2 - 55r + 150 = 0$
$5(r^2 - 11r + 30) = 0$
$5(r-5)(r-6) = 0$
$\cancel{5=0} \quad r-5=0 \quad r-6=0 \quad \boxed{5, 6}$
$\qquad\qquad r=5 \qquad r=6$

3.) Identify the roots to write a quadratic equation for the graph below.

$X = -2 \qquad X = 2$

$\boxed{(X+2)(X-2) \\ y = X^2 - 4}$

4.) Which expression has roots at -3 and 2?

A. $f(x) = x^2 + x - 6$
$\quad -3, 2$

B. $f(x) = x^2 - x - 6$
$\quad -2, 3$

C. $f(x) = x^2 + 3x - 2$
$\quad -3.56, .56$

D. $f(x) = x^2 - 3x + 2$
$\quad 1, 2$

5.) What is the smaller of two negative consecutive integers whose product is 35?

$n(n+2) = 35$
$n^2 + 2n = 35$
$n^2 + 2n - 35 = 0$
$(n+7)(n-5) = 0$
$n+7=0 \qquad n-5=0$
$n = -7 \qquad n = 5$

$\boxed{-7}$

6.) What is the minimum value of the function $f(x) = x^2 - 2x - 15$?

$X = \dfrac{2}{2(1)} = 1$

$f(x) = (1)^2 - 2(1) - 15$
$\quad = -16$

$\boxed{(1, -16)}$

7.) Tonisha hit a ball into the air with an initial upward velocity of 80 feet per second. The height, $h(t)$, in feet of the ball above the ground can be modeled by $h(t) = -16t^2 + 80t + 3$ where t is the time in seconds after she hit the ball. How long does it take the ball to reach its maximum height?

$\hookrightarrow$ AOS

$$X = \frac{-80}{2(-16)} \quad \boxed{X = 2.5 \, swc}$$

8.) Three times the greater of two consecutive even integers is two more than the square of the smaller. Find one of the numbers.

$n = 1^{st}$ int.
$n+2 = 2^{nd}$ int.

$3(n+2) = n^2 + 2$
$3n + 6 = n^2 + 2$
$-3n - 6 \quad -3n - 6$
$0 = n^2 - 3n - 4$

$(n-4)(n+1) = 0$
$n - 4 = 0 \quad n + 1 = 0$
$n = 4 \quad n = -1$

$\boxed{n = 4 \text{ OR } n = -1}$

9.) What is the **sum** of the roots of the following equation?

$$f(x) = x^2 - 8x + 7$$

$(X-1)(X-7) = 0$
$X - 1 = 0 \quad X - 7 = 0$
$X = 1 \quad X = 7$ *

$\boxed{\text{sum} = 8}$

10.) 22. A square is altered so that one dimension is increased by 3 and the other dimension is decreased by 4. The area of the resulting rectangle is 60. Find the area of the original square.

$(S+3)(S-4) = 60$
$S^2 - 4S + 3S - 12 = 60$
$S^2 - S - 12 = 60$
$S^2 - S - 72 = 0$
$(S-9)(S-8) = 0$

$S - 9 = 0$
$S = 9$
$A = S^2$

$\boxed{A = 81 \text{ units}^2}$

11.) Which expression represents the solution to the equation $2x^2 + 4x - 4$?

$$X = \frac{-4 \pm \sqrt{(4)^2 - 4(2)(-4)}}{2(2)}$$

A. $1 + \sqrt{3}$

$X = \frac{-4 \pm \sqrt{48}}{4}$

B. $-1 - \sqrt{3}$

C. $-1 + 4\sqrt{3}$

$X = \frac{-4 \pm 4\sqrt{3}}{4}$

D. $-1 - 4\sqrt{3}$

$X = -1 \pm \sqrt{3}$

12.) Use the quadratic formula to evaluate the quadratic function below:

$$2x^2 + 9x - 15 = 0$$

$X = \frac{-9 \pm \sqrt{(9)^2 - 4(2)(-15)}}{2(2)}$

$X = \frac{-9 \pm \sqrt{201}}{4}$

$\boxed{-5.79, 1.29}$

13.) The discriminant of a quadratic equation is -16. Determine the number of solutions.

$\boxed{\text{no Rual Roots}}$

14.) Use the discriminant to determine the number of solutions:

$$-3x^2 + 5x - 1$$

$d = b^2 - 4ac$
$= (5)^2 - 4(-3)(-1)$
$d = 13$

$\boxed{2 \text{ solutions}}$

15.) Suppose the equation $V = 40x^2 - 500x + 5000$ describes the value of a car from 1960 to 2012. What year did the car have the least value? Lot 1960 bu X=0

A. 1965 $3500

B. 1966 $3440

C. 1967 $3400

D. 1968 $3500

16.) What is the distance, in units, between the y-intercept of $g(x) = x^2 + 7x - 18$ and the y-intercept of the linear function that passes through the points shown in the table below?

x	g(x)
-5	2
10	11
25	20
60	41

y-int $g(x) = -18$
y-int table = 5

distance = 23 units

17.) Two functions are shown below.
$$f(x) = x^2 + x - 2$$
$$g(x) = -x + 1$$
Identify the point(s) at which the graphs of the two functions intersect.

(1, 0)
(-3, 4)

18.) A textile manufacturer has daily production costs of $C(x) = 10,000 - 110x + 0.045x^2$, where $C(x)$ is the total cost (in dollars) and x is the number of units produced. How many units should be produced each day to yield a minimum cost?

$X = \dfrac{110}{2(.045)}$

$X = 1222.22$

1223 units

19.) The area of a rectangular lot is represented by the expression $2x^2 + x - 28$. The area of an adjacent rectangular lot is represented by the expression $2x^2 + 9x + 4$. The perimeter of the adjacent lot is 790 feet. What is the difference in the areas of the two lots?

$2x^2 + x - 28$ $2x^2 + 9x + 4$
$(2x^2 + 8x)(-7x - 28)$ $(2x^2 + 8x)(x + 4)$
$2x(x+4) - 7(x+4)$ $2x(x+4) + 1(x+4)$
$(2x-7)(x+4)$ $(2x+1)(x+4)$
                    $2(2x+1) + 2(x+4)$

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20.) Suppose the equation $h(t) = -t^2 + 5t + 14$ models the height of a ball thrown into the air off the bleachers. Which statement about the flight of the ball is true?

~~A.~~ The ball starts from a height of 19 feet.

B. The ball takes 5 seconds to hit the ground.

C. The ball takes 14 seconds to hit the ground.

D. The ball reaches a maximum height of 20.25 feet.

21.) Write a quadratic equation that has an axis of symmetry at $x = -2$.

$y = 3x^2 + 12x - 5$

$14x + 2 + 2x + 8 = 790$
$6x + 10 = 790$
$6x = 780$
$X = 130$

Area
Lot 1 = 33902

22.) What is the larger zero of the function defined by $f(x) = x^2 - 7x - 18$?

$X = 9$

Area
Lot 2 = 34974

23.) A path was built through a ravine. The entrance and exit to the path are located at the x-intercepts when the path is placed on a coordinate grid. The depth of the ravine is modeled by $D(x) = 0.1x^2 + 0.1x - 11$, where x is the horizontal distance in yards. How many feet is the horizontal distance of the path?

FROM X-int to
X-int

A. 1 foot

B. 3 feet

C. 21 feet

D. 63 feet

ROOTS
−11   10

24.) A diagram of an arched window for a model house is placed on a coordinate grid. The base of the window is on the x-axis. The arch of the window is modeled by $h(x) = -4x^2 + 10x - 6$, where x is in inches. What is the length of the base of the window?

dist betwuun
X-ints
(1,0) (1.5)

0.5 units